

REMARKS

Claims 1-15 and 17-33 are pending in the present Application. Claims 1-13 and 27-31 have been withdrawn from consideration by the Examiner. Claims 14, 19, and 32-33 have been amended, leaving Claims 14-15, 17-26, and 32-33 for consideration upon entry of the present amendment.

Support for the amendment to Claims 14 and 19 can be found at least in paragraphs [0038], [0039], and Figure 8. Claims 32-33 have been amended to correct inconsistencies in terminology only, as discussed further below, and have full support within the specification as further noted by the Examiner on page three (3) of the pending Office Action. No new matter has been introduced by way of the amendments.

Reconsideration and allowance of the claims are respectfully requested in view of the following remarks.

Claim Objections

The Examiner has objected to claims 14-15, 17-26, and 32-33 as lacking consistency in terminology. Applicants have corrected the inconsistencies as recommended by the Examiner. Withdrawal of this objection is respectfully requested.

Claim Rejections Under 35 U.S.C. § 102(b)

A. Claims 14, 15, 17-26, 18 and 32 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by Gaisford (US 5,103,181). Applicants respectfully traverse this rejection.

“[A] claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, *in a single prior art reference.*” *Verdegaal Bros. V. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987) (emphasis added). Moreover, “[t]he identical invention must be shown in as complete detail as is contained in the *** claim.” *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989). Furthermore, the single source must disclose

all of the claimed elements “*arranged as in the claim.*” *Structural Rubber Prods. Co. v. Park Rubber Co.*, 749 F.2d 707, 716, 223 U.S.P.Q. 1264, 1271 (Fed. Cir. 1984) (Emphasis added)

Claim 14 is directed to a material detection system, comprising a plasma processing chamber configured to uniformly convey plasma onto the surface of a work-piece contained therein; a flow path in fluid communication with the processing chamber, the flow path configured to contain the medium of interest transported to and from the plasma processing chamber, wherein the medium of interest contains a solid material and/or gaseous byproduct removed from the work-piece; an electromagnetic energy source downstream from the plasma processing chamber coupled to the flow path for exciting said medium of interest so as to volatilize the solid material contained therein; and an impedance measuring device for measuring an impedance value of an electromagnetic circuit, said electromagnetic circuit including said flow path therein, wherein said impedance value corresponds to an amount of solid material within said medium of interest.

Gaisford fails to disclose each and every element of claim 1. For example, Gaisford fails to disclose a material detection system including an electromagnetic energy source downstream from a plasma processing chamber configured to uniformly convey plasma onto the surface of a work-piece contained therein. Rather, Gaisford merely discloses a funnel-like apparatus for what appears to gravity feed a fluid of interest into a conduit. There is no plasma processing chamber disclosed in Gaisford’s system, let alone a plasma processing chamber configured to uniformly convey plasma onto the surface of a work-piece contained therein.

Moreover, Gaisford fails to disclose a material detection system comprising an electromagnetic energy source coupled to the flow path for exciting said medium of interest *so as to volatilize the solid material contained therein*. Rather, Gaisford discloses a method and apparatus for determining the composition, homogeneity, and/or flow rate of a material. (See Gaisford, Col. 13, ll. 4-9). The material may be composed of any of three physical states of matter including only the solid, liquid and gaseous states, and is absent of any plasma state of matter (see Gaisford, Abstract, and col. 7, ll. 13-17). Gaisford directly monitors the electrical impedance properties of the fluid to determine the fractional compositional make-up. (See Gaisford Col. 1, ll. 10-15) *and does not alter the physical state of the fluid*. Instead, Gaisford’s apparatus monitors

the composition of a multi-component fluid flowing in a pipe *without significantly interfering with the components within the fluid*. (See Gaisford, Col. 6, ll. 50-54.)

Applicants do not concede that an apparatus explicitly stated to be configured as to not interfere with components within Gaisford's fluid flow to be able to function as an apparatus also configured to volatilize a portion of a fluid flowing therein. *The change of a physical state of matter contained within the fluid would surely alter the composition and thus the flow of the fluid*. This is not the same as Applicants' claimed system wherein said electromagnetic energy source is coupled to the flow path for exciting the medium of interest in order to volatilize the solid material contained therein.

Therefore, as discussed above, Gaisford fails to disclose or reasonably suggest "a plasma processing chamber configured to uniformly convey plasma onto the surface of a work-piece contained therein" and "an electromagnetic energy source downstream from the plasma processing chamber coupled to the flow path for exciting said medium of interest so as to volatilize the solid material contained therein" as recited in claim 1. Moreover, Gaisford fails to disclose all of the claimed elements as "*arranged as in the claim.*"

For at least these reasons, Gaisford fails to provide disclosure of the claimed material detection system. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection applied to independent Claim 14. Given that Claims 15, 17-26, 18 and 32 depend from, and include all the limitations of, their respective base claim, they too are patentable.

B. Claims 19, 20, 22, 23, and 33 stand rejected under 35 U.S.C. § 102(b), as allegedly anticipated by Gaisford (US 5,103,181). Applicants respectfully traverse this rejection.

Initially, Applicants direct the Examiner's attention to the discussion provided in section A above with regards to independent claim 14. Independent claim 19 includes features somewhat similar to those argued above with respect to claim 14, although each claim should be interpreted solely by those limitations contained therein.

Claim 19 is directed to a plasma based semiconductor material removal system comprising a plasma processing chamber configured to uniformly convey plasma onto a surface of a work-piece contained therein; an electromagnetic energy source coupled to an effluent carrying conduit downstream from a plasma processing chamber, wherein the electromagnetic energy source is configured to cause excitation of a gas having reactive species therein, wherein the excited gas may include a solid material and/or gaseous byproducts removed from a semiconductor work-piece within the plasma processing chamber, and wherein the excitation is effective to volatize the solid material; and a mechanism for uniformly conveying the excited gas.

Gaisford fails to disclose each and every element of claim 19. For example, Gaisford fails to disclose a plasma based semiconductor material removal system comprising an electromagnetic energy source downstream from a plasma processing chamber, wherein excited gas may include a solid material removed from a semiconductor work-piece within the plasma processing chamber, the plasma processing chamber being configured to uniformly convey plasma onto a surface of a work-piece contained therein. Rather, Gaisford merely discloses a funnel-like apparatus for what appears to gravity feed a fluid of interest into a conduit. There is no plasma processing chamber disclosed in Gaisford's system, let alone a plasma processing chamber including a semiconductor work-piece and a mechanism for uniformly conveying the excited gas onto the semiconductor work-piece.

Moreover, Gaisford fails to disclose a plasma based semiconductor material removal system comprising electromagnetic energy source configured to cause excitation of a gas having reactive species therein, wherein *the excitation is effective to volatize the solid material*. Rather, Gaisford discloses a method and apparatus for determining the composition, homogeneity, and/or flow rate of a material. (See, Gaisford, Col. 13, ll. 4-9.) The material may be composed of any of three physical states of matter including only the solid, liquid and gaseous states, and is absent of any plasma state of matter (see Gaisford, Abstract, and col. 7, ll. 13-17). Gaisford directly monitors the electrical impedance properties of the fluid to determine the fractional compositional make-up. (See, Gaisford Col. 1, ll. 10-15.) *and does not alter the physical state of the fluid*. Instead, Gaisford's apparatus monitors the composition of a multi-component fluid flowing in a pipe

without significantly interfering with the fluid flow. (See Gaisford, Col. 6, ll. 50-54.)

Applicants do not concede that an apparatus explicitly stated to be configured as to not interfere with fluid flow to be able to function as an apparatus also configured to volatilize a portion of a fluid flowing therein. *The change of a physical state of matter contained within the fluid would surely alter the composition and thus the flow of the fluid.* This is not the same as Applicants' claimed system wherein said electromagnetic energy source excites the medium of interest in order to volatilize the solid material removed from the semiconductor contained therein.

For at least these reasons, Gaisford fails to provide disclosure of the claimed plasma based semiconductor material removal system. Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection applied to independent Claim 19. Given that Claims 20, 22, 23, and 33 depend from, and include all the limitations of, their respective base claim, they too are patentable.

Claim Rejections Under 35 U.S.C. § 103(a)

A. Claims 19, 20, 22, 23, and 33 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Gaisford. Applicants respectfully traverse this rejection.

Gaisford is discussed above with regards to independent claim 19 in detail, and as stated above, Gaisford fails to disclose or reasonably suggest every element of claim 19. However, the Examiner appears to assert that in a modified construction of Gaisford's apparatus, the apparatus is capable of processing plasma and vaporizing a solid material removed through plasma processing (see Office Action, response to arguments section).

Applicants respectfully submit that the Examiner, in arriving at this specific construction, has destroyed the intent of the Gaisford reference. In this regard, the courts have held that "[i]f the proposed modification would render the prior art invention being modified unsatisfactorily for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon* 733 F. 2d 900, 221 USPQ 1125 (Fed. Cir. 1984). The courts have also held that '[i]f the proposed modification or combination of the prior art would change the principle of

operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious.” *In re Ratti* 270 F. 2d 810, 123 USPQ 349 (CCPA 1959).

First, it is noted that Gaisford fails to disclose “a plasma processing chamber configured to uniformly convey plasma onto a surface of a work-piece contained therein” as featured in claim 19. Furthermore, Gaisford gives no indication of a plasma processing chamber or the capability to process plasma in the “funnel” asserted by the Examiner (see FIG. 11, Gaisford). Instead Gaisford explicitly states that the apparatus disclosed is configured to detect the presence/composition of one of three distinct states of matter, the solid, liquid, and gaseous states (or combinations; see Gaisford, Abstract). It is known that plasma is considered a distinct state of matter due to drastic differences in conductivity and response to electromagnetic energy. Given that Gaisford is dependent of conductive walls of a measurement tube for composition measurements (see Gaisford col. 8, ll. 61-63), and includes terminal reactive and resistive loads around said measurement tube (see Gaisford col. 14, ll. 23-24), it follows that a flow of a highly conductive plasma state of matter through a conductive tube relying on terminal resistive and reactive loads would render the effectiveness of the measurement apparatus null and destroy the principle of operation of the apparatus.

Furthermore, Gaisford fails to disclose or reasonably suggest “excitation [that] is effective to volatilize the solid material” as featured in claim 19. However, the Examiner appears to contend that “nothing about Gaisford precludes this possibility were the EM source turned high enough” (see Office Action, page 2). Applicants respectfully disagree. In fact, Gaisford particularly states that the intent of the apparatus is to determine the composition of a material (see col. 13, ll. 1-37). Applicants assert that to excite the material so as to volatilize a portion of that material would effectively change the physical state of the material from a solid state to a gaseous state. Such would destroy the intent of Gaisford’s apparatus because you cannot determine if a material input to the apparatus is solid or liquid if it has been volatilized.

As such, as modification of Gaisford as required by this rejection would effectively destroy both the operation and intent of Gaisford, thus claim 19 is patentable over Gaisford. Claims 20, 22,

23, and 33 are likewise patentable at least by virtue of their dependency upon independent claim 19.

In view of the forgoing, the rejection is requested to be withdrawn.

C. Claim 21 stands rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Gaisford as applied to Claim 19 above, and further in view of Mills (2004/0018348A1) and Beaudry (U.S. 3,569,777). Applicants respectfully traverse this rejection.

Claim 21 is dependent upon Claim 19 and as such is directed to a plasma based semiconductor material removal system comprising, *inter alia*, an electromagnetic energy source coupled to an effluent carrying conduit downstream from a plasma processing chamber, wherein the electromagnetic energy source is configured to cause excitation of a gas having reactive species therein, wherein the excited gas may include a solid material removed from a semiconductor work-piece within the plasma processing chamber, and wherein the excitation is effective to volatilize the solid material.

Gaisford is discussed above and fails to disclose or suggest at least these features. Furthermore, as discussed in the response filed June 26, 2008 which is hereby incorporated in its entirety herein, Mills and Beaudry fail to cure these deficiencies. Therefore, even if the references were combinable (which Applicants do not admit), any combination would still fail to disclose these features. As such, claim 19 is patentable over Gaisford, Beaudry, and Mills, alone or in any combination. Claims 20, 22, 23, and 33 are likewise patentable at least by virtue of their dependency upon independent claim 19.

In view of the forgoing, the rejection is requested to be withdrawn.

D. Claim 24-26 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Gaisford as applied to Claim 22 above, and further in view of Beaudry (U.S. 3,569,777). Applicants respectfully traverse this rejection.

Claims 24-26 are dependent upon Claim 19 and as such is directed to a plasma based semiconductor material removal system comprising, *inter alia*, an electromagnetic energy source

coupled to an effluent carrying conduit downstream from a plasma processing chamber, wherein the electromagnetic energy source is configured to cause excitation of a gas having reactive species therein, wherein the excited gas may include a solid material removed from a semiconductor work-piece within the plasma processing chamber, and wherein the excitation is effective to volatilize the solid material.

Gaisford is discussed above and fails to disclose or suggest at least these features. Furthermore, as discussed in the response filed June 26, 2008 Beaudry fails to cure these deficiencies. Therefore, even if the references were combinable (which Applicants do not admit), any combination would still fail to disclose these features. As such, claim 19 is patentable over Gaisford, and Beaudry, alone or in any combination. Claims 24-26 are likewise patentable at least by virtue of their dependency upon independent claim 19.

In view of the forgoing, the rejection is requested to be withdrawn.

It is believed that the foregoing remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and allowance are requested.

The Examiner is invited to contact Applicant's attorneys at the below listed telephone number regarding this Amendment or otherwise regarding the present application.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,
CANTOR COLBURN LLP

Date: November 18, 2008
CANTOR COLBURN LLP
20 Church Street, 22nd Floor
Hartford, CT 06130-3207
Telephone (404) 607-9991
Facsimile (404) 607-9981
Customer No.: 23413

By: /Peter R. Hagerty/
Peter R. Hagerty
Registration No. 42,618